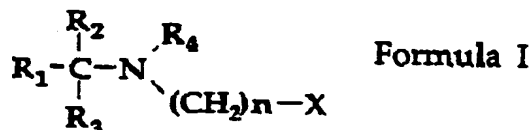


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**WE CLAIM:**

1. A compound of the Formula I



wherein:

- $R_1$  is  $(CH_2)_mCH_3$  where  $m$  is 0 or an integer in the range from 1 to 16, or an alkenyl, alkynyl, alkoxy, alkylthio, or alkyl sulfinyl group having from 2 to 17 carbon atoms, wherein  $R_1$  may be optionally substituted with one or more substituents selected from hydroxy, aldehyde, oxo, lower acyloxy, halogen, thio, sulfoxide and sulfone,
- $R_2 = H, CH_3$  or  $CH_2CH_3$ ,
- $R_3 = H$  or  $CH_3$ ,
- $R_4 = H$  or  $CH_3$ ,
- $R_5 =$  lower alkyl having from 1 to 5 carbon atoms,
- $n$  is an integer in the range from 1 to 3,
- and  $X$  is carboxyl ( $COOH$ ) or carbalkoxy ( $COOR_5$ ), cyano ( $C \equiv N$ ), phosphonic acid ( $PO_3H_2$ ), phosphonate ester ( $PO_3[R_5]_2$ ) or 5-tetrazole, as a substantially pure enantiomer in the  $R$  or  $S$  configuration or a pharmaceutically acceptable salt thereof.

2. A compound of the Formula I according to claim 1 wherein:
- $R_1 = (CH_2)_mCH_3$  where  $m$  is 0 or an integer in the range from 1 to 16,
- $R_2 = CH_3$ ,
- $R_3 = H$ ,
- $R_4 = H$  or  $CH_3$ ,
- $R_5 =$  lower alkyl having from 1 to 5 carbon atoms,
- $n$  is an integer in the range from 1 to 3,

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and X is carboxyl (COOH) or carbalkoxy (COOR<sub>5</sub>), cyano (C≡N), phosphonic acid (PO<sub>3</sub>H<sub>2</sub>), phosphonate ester (PO<sub>3</sub>[R<sub>5</sub>]<sub>2</sub>) or 5-tetrazole, or a pharmaceutically acceptable salt thereof.

3. A compound of the Formula I according to claim 1 wherein:

5 R<sub>1</sub> = (CH<sub>2</sub>)<sub>m</sub>CH<sub>3</sub> where m is 0 or an integer in the range from 1 to 16,

R<sub>2</sub> = CH<sub>3</sub>,

R<sub>3</sub> = H,

R<sub>4</sub> = H or CH<sub>3</sub>,

R<sub>5</sub> = lower alkyl having from 1 to 5 carbon atoms,

10 n is an integer in the range from 1 to 3,

and X is carboxyl (COOH) or carbalkoxy (COOR<sub>5</sub>) cyano (C≡N), phosphonic acid (PO<sub>3</sub>H<sub>2</sub>), phosphonate ester (PO<sub>3</sub>[R<sub>5</sub>]<sub>2</sub>) or 5-tetrazole, as a substantially pure enantiomer in the R-configuration, or a pharmaceutically acceptable salt thereof.

15 4. A compound of the formula I according to claim 1 wherein:

R<sub>1</sub> = (CH<sub>2</sub>)<sub>m</sub>CH<sub>3</sub> where m is 0 or an integer in the range from 1 to 16,

R<sub>2</sub> = CH<sub>3</sub>,

R<sub>3</sub> = H,

R<sub>4</sub> = H or CH<sub>3</sub>,

20 R<sub>5</sub> = lower alkyl having from 1 to 5 carbon atoms,

n is an integer in the range from 1 to 3,

and X is carboxyl (COOH) or carbalkoxy (COOR<sub>5</sub>) cyano (C≡N), phosphonic acid (PO<sub>3</sub>H<sub>2</sub>), phosphonate ester (PO<sub>3</sub>[R<sub>5</sub>]<sub>2</sub>) or 5-tetrazole, as a substantially pure enantiomer in the S-configuration, or a pharmaceutically acceptable salt thereof.

5. A compound according to claim 3, wherein said compound of formula I is selected from the group consisting of:

(R)-3-(2-Heptylamino)propionic acid;

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- (R)-3-(2-Heptylmethylamino)propionic acid;  
Methyl (R)-3-(2-heptylamino)propionate;  
Methyl (R)-3-(2-heptylmethylamino)propionate;  
(R)-2-(2-Pentylamino)acetonitrile;  
5 (R)-2-(2-Pentylmethylamino)acetonitrile;  
(R)-3-(2-Heptylamino)propionitrile;  
(R)-3-(2-Heptylmethylamino)propionitrile;  
(R)-2-(2-Pentylamino)ethanephosphonic acid;  
(R)-2-(2-Pentylmethylamino)ethanephosphonic acid; and  
10 (R)-2-(2-Heptylamino)ethane-5-tetrazole.

6. A compound according to claim 4, wherein said compound of formula I is selected from the group consisting of:  
(S)-2-(2-Heptylamino)acetic acid;  
(S)-2-(2-Heptylmethylamino)acetic acid;  
15 Methyl (S)-2-(2-heptylamino)acetate;  
Methyl (S)-2-(2-heptylmethylamino)acetate;  
(S)-2-(2-Heptylamino)acetonitrile;  
(S)-2-(2-Heptylmethylamino)acetonitrile;  
(S)-2-(2-Heptylamino)ethanephosphonic acid; and  
20 (S)-2-(2-Heptylmethylamino)ethanephosphonic acid.

7. A compound selected from the group consisting of:  
2-(1-Hexylmethylamino)acetic acid;  
3-(2-Propylmethylamino)propionic acid;  
Methyl 2-(2-propylmethylamino)acetate;  
25 Methyl 2-(1-hexylmethylamino)acetate;  
Methyl 3-(1-hexylmethylamino)propionate;  
2-(1-Hexylamino)acetonitrile;  
2-(1-Hexylmethylamino)acetonitrile;  
3-(3-Pentylamino)propionitrile;  
30 3-(3-Pentylmethylamino)propionitrile;

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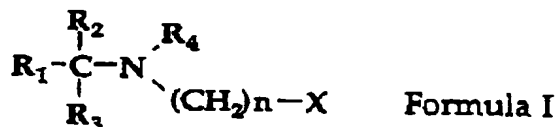
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2-(2-Propylamino)ethanephosphonic acid; and  
 2-(2-Propylmethylamino)ethanephosphonic acid.

8. A compound according to any one of claims 1 to 7 in the form of a hydrochloride salt.
- 5 9. A compound according to any one of claims 1 to 4 wherein m is an integer from 1 to 12.
10. A compound according to any one of claims 1 to 4 wherein m is an integer from 1 to 9.
11. A composition for the treatment or prevention of a disease in  
 10 which cell death occurs by apoptosis, which composition comprises an effective amount of a compound having the formula I:



wherein:

- 15  $\text{R}_1$  is  $(\text{CH}_2)_m\text{CH}_3$  where m is 0 or an integer in the range from 1 to 16, or an alkenyl, alkynyl, alkoxy, alkylthio, or alkyl sulfinyl group having from 2 to 17 carbon atoms, wherein  $\text{R}_1$  may be optionally substituted with one or more substituents selected from hydroxy, aldehyde, oxo, lower acyloxy, halogen, thio, sulfoxide and sulfone,
- 20  $\text{R}_2 = \text{H}, \text{CH}_3$  or  $\text{CH}_2\text{CH}_3$ ,  
 $\text{R}_3 = \text{H}$  or  $\text{CH}_3$ ,  
 $\text{R}_4 = \text{H}$  or  $\text{CH}_3$ ,  
 $\text{R}_5 =$  lower alkyl having from 1 to 5 carbon atoms,  
 n is an integer in the range from 1 to 3,

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and X is carboxyl (COOH), carbalkoxy (COOR<sub>5</sub>), cyano (C≡N), phosphonic acid (PO<sub>3</sub>H<sub>2</sub>), phosphonate ester (PO<sub>3</sub>[R<sub>5</sub>]<sub>2</sub>) or 5-tetrazole, as a substantially pure enantiomer in the R or S configuration or a pharmaceutically acceptable salt thereof, in admixture with a suitable diluent or carrier.

- 5 12. A composition according to claim 11, wherein:  
R<sub>1</sub> is (CH<sub>2</sub>)<sub>m</sub>CH<sub>3</sub> where m is 0 or an integer in the range from 1 to 16,  
R<sub>2</sub> = CH<sub>3</sub>,  
R<sub>3</sub> = H,  
R<sub>4</sub> = H or CH<sub>3</sub>,  
10 R<sub>5</sub> = lower alkyl having from 1 to 5 carbon atoms,  
n is an integer in the range from 1 to 3,  
and X is carboxyl (COOH), carbalkoxy (COOR<sub>5</sub>), cyano (C≡N), phosphonic acid (PO<sub>3</sub>H<sub>2</sub>), phosphonate ester (PO<sub>3</sub>[R<sub>5</sub>]<sub>2</sub>) or 5-tetrazole, or a pharmaceutically acceptable salt thereof, in admixture with a suitable  
15 diluent or carrier.
13. A composition according to claim 11, wherein said compound of formula I is selected from the group consisting of:  
(R)-3-(2-Heptylamino)propionic acid;  
(R)-3-(2-Heptylmethylamino)propionic acid;  
20 Methyl (R)-3-(2-heptylamino)propionate;  
Methyl (R)-3-(2-heptylmethylamino)propionate;  
(R)-2-(2-Pentylamino)acetonitrile;  
(R)-2-(2-Pentylmethylamino)acetonitrile;  
(R)-3-(2-Heptylamino)propionitrile;  
25 (R)-3-(2-Heptylmethylamino)propionitrile;  
(R)-2-(2-Pentylamino)ethanephosphonic acid;  
(R)-2-(2-Pentylmethylamino)ethanephosphonic acid; and  
(R)-2-(2-Heptylamino)ethane-5-tetrazole.

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14. A composition according to claim 11, wherein said compound of formula I is selected from the group consisting of:

(S)-2-(2-Heptylamino)acetic acid;

(S)-2-(2-Heptylmethylamino)acetic acid;

5 Methyl (S)-2-(2-heptylamino)acetate;

Methyl (S)-2-(2-heptylmethylamino)acetate;

(S)-2-(2-Heptylamino)acetonitrile;

(S)-2-(2-Heptylmethylamino)acetonitrile;

(S)-2-(2-Heptylamino)ethanephosphonic acid; and

10 (S)-2-(2-Heptylmethylamino)ethanephosphonic acid.

15. A composition for the treatment or prevention of a disease in which cell death occurs by apoptosis, which composition comprises an effective amount of a compound selected from the group consisting of:

2-(1-Hexylmethylamino)acetic acid;

15 3-(2-Propylmethylamino)propionic acid;

Methyl 2-(2-propylmethylamino)acetate;

Methyl 2-(1-hexylmethylamino)acetate;

Methyl 3-(1-hexylmethylamino)propionate;

2-(1-Hexylamino)acetonitrile;

20 2-(1-Hexylmethylamino)acetonitrile;

3-(3-Pentylamino)propionitrile;

3-(3-Pentylmethylamino)propionitrile;

2-(2-Propylamino)ethanephosphonic acid; and

2-(2-Propylmethylamino)ethanephosphonic acid

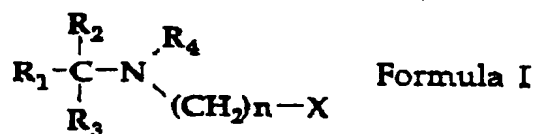
25 in admixture with a suitable diluent or carrier.

16. A composition according to any one of claims 11 to 15, wherein the compound of formula I is in the form of a hydrochloride salt.

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17. A use of a compound of the formula I for the treatment or prevention of a disease in which cell death occurs by apoptosis, wherein said compound has the formula I:

5



wherein:

$\text{R}_1$  is  $(\text{CH}_2)_m\text{CH}_3$  where  $m$  is 0 or an integer in the range from 1 to 16, or an alkenyl, alkynyl, alkoxy, alkylthio, or alkyl sulfinyl group having from 2 to 17 carbon atoms, wherein  $\text{R}_1$  may be optionally substituted with one or more substituents selected from hydroxy, aldehyde, oxo, lower acyloxy, halogen, thio, sulfoxide and sulfone,

$\text{R}_2 = \text{H}, \text{CH}_3$  or  $\text{CH}_2\text{CH}_3$

$\text{R}_3 = \text{H}$  or  $\text{CH}_3$

15  $\text{R}_4 = \text{H}$  or  $\text{CH}_3$

$\text{R}_5 =$  lower alkyl having 1 to 5 carbon atoms

$n$  is an integer in the range from 1 to 3,

and  $\text{X}$  is carboxyl ( $\text{COOH}$ ), carbalkoxy ( $\text{COOR}_5$ ), cyano ( $\text{C}\equiv\text{N}$ ), phosphonic acid ( $\text{PO}_3\text{H}_2$ ), phosphonate ester ( $\text{PO}_3[\text{R}_5]_2$ ) or 5-tetrazole, or a pharmaceutically acceptable salt thereof.

18. A use according to claim 17, wherein

$\text{R}_1$  is  $(\text{CH}_2)_m\text{CH}_3$  where  $m$  is 0 or an integer in the range from 1 to 16,

$\text{R}_2 = \text{CH}_3$ ,

$\text{R}_3 = \text{H}$ ,

25  $\text{R}_4 = \text{H}$  or  $\text{CH}_3$ ,

$\text{R}_5 =$  lower alkyl having 1 to 5 carbon atoms,

$n$  is an integer in the range from 1 to 3,

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and X is carboxyl (COOH), carbalkoxy (COOR<sub>5</sub>), cyano (C≡N), phosphonic acid (PO<sub>3</sub>H<sub>2</sub>), phosphonate ester (PO<sub>3</sub>[R<sub>5</sub>]<sub>2</sub>) or 5-tetrazole, or a pharmaceutically acceptable salt thereof.

19. A use according to claim 17 or 18 wherein the compound of  
5 the Formula I is a substantially pure enantiomer in the R configuration.

20. A use according to claim 17 or 18 wherein the compound of  
the Formula I is a substantially pure enantiomer in the S configuration.

21. A use according to claim 17 wherein said compound of  
Formula I is selected from the group consisting of:

- 10 2-(2-Propylamino)acetic acid;  
2-(1-Hexylamino)acetic acid;  
(S)-2-(2-Heptylamino)acetic acid;  
3-(2-Propylamino)propionic acid;  
3-(1-Hexylamino)propionic acid;  
15 (R)-3-(2-Heptylamino)propionic acid;  
2-(2-Propylmethyamino)acetic acid;  
2-(1-Hexylmethyamino)acetic acid;  
(S)-2-(2-Heptylmethylamino)acetic acid;  
3-(2-Propylmethyamino)propionic acid;  
20 3-(1-Hexylmethyamino)propionic acid;  
(R)-3-(2-Heptylmethylamino)propionic acid;  
2-(2-Propylamino)acetonitrile;  
(R)-2-(2-Pentylamino)acetonitrile;  
2-(1-Hexylamino)acetonitrile;  
25 (S)-2-(2-Heptylamino)acetonitrile;  
(R)-3-(2-Heptylamino)propionitrile;  
2-(2-Propylmethyamino)acetonitrile;  
(R)-2-(2-Pentylmethyamino)acetonitril ;  
2-(1-Hexylmethyamino)acetonitrile;



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- (S)-2-(2-Heptylmethylamino)acetonitrile;  
(R)-3-(2-Heptylmethylamino)propionitrile;  
2-(2-Propylamino)ethanephosphonic acid;  
(R)-2-(2-Pentylamino)ethanephosphonic acid;  
5 (S)-2-(2-Heptylamino)ethanephosphonic acid;  
2-(2-Propylmethylamino)ethanephosphonic acid;  
(S)-2-(2-Heptylmethylamino)ethanephosphonic acid; and  
(R)-2-(2-Heptylamino)ethane-5-tetrazole.
22. A use according to any one of claims 17 to 21 wherein the  
10 disease is selected from the group consisting of stroke, head trauma, Bell's  
palsy, spinal cord injury, Alzheimer's disease, Parkinson's disease, Pick's  
disease, amyotrophic lateral sclerosis, Huntington's disease, multiple  
sclerosis, cardiac myopathies, nephropathy, retinopathy, diabetic  
complications, glaucoma and idiopathic neuropathies.
- 15 23. A use according to any one of claims 17 to 22, for the  
treatment of a human.
24. A commercial package for the treatment or prevention of a  
disease in which cell death occurs by apoptosis, said package comprising a  
pharmaceutical composition according to any one of claims 11 to 16,  
20 together with instructions for use in the treatment or prevention of  
diseases in which cell death occurs by apoptosis.